

## Intelligent Wireless Fiber Optic Sensor (iWiSe) Network System, Phase I

Completed Technology Project (2018 - 2019)



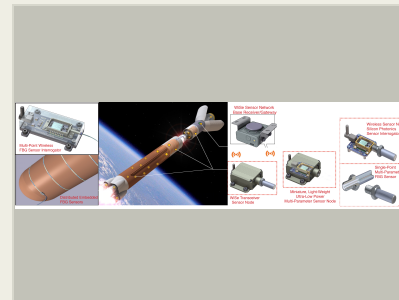
## Project Introduction

Redondo Optics Inc. (ROI), proposes to design, build, bench and fly test, and deliver to NASA an innovative light weight, small-form-factor, ultra-low power, readily reconfigure intelligent wireless fiber optic sensor (iWiSe™) network system suitable for the remote monitoring of multi-dimensional sensing events – strain, temperature, heat-flow, pressure, vibration, acoustics, ultrasound, etc. – measured by a global network of wireless and self-powered iWiSe™ sensing nodes used to interrogate embedded or surface mounted FBG sensors suitable for operation within the extreme environmental conditions and hard to reach inaccessible locations of large space vehicle rocket propulsion systems. In the Phase I program, ROI will develop a laboratory bench top prototype of the Self-Power Intelligent Wireless iWiSe™ sensor network system to demonstrate its capability to measure static and dynamic sensor data using an iWiSe sensing node interrogating a distributed array of multi-dimensional FBG sensing elements positioned within hard to reach and poorly accessible areas of a space vehicle, and to wirelessly transmit the sensor status data to a remote iWiSe™ data logger receiver/gateway connected via wireless/Ethernet network for global access to NASA's system condition users (operators, customers, management, etc.). In Phase II of ROI will complete the engineering development, produce, extensively laboratory test, environmentally qualify on a relevant rocket space vehicle-like platform, and deliver to NASA a light weight, space-ready, self-power, intelligent wireless WiSe™ sensor network SHM system.

## Anticipated Benefits

All of NASA's current and future space vehicle programs will benefit significantly from this project, wherein the key technological challenge is to develop methodologies for high fidelity monitoring and characterization of load, stress, strain, flaws, fatigue, and degradation in complex built-up structures.

***ROI's compact, non-intrusive, and cost efficient WiSe™ system is poised to revolutionize the field of wireless fiber optic sensor structural health monitors for aerospace and aircraft applications and to gain a rapid acceptance into the wireless sensor network market, a rapidly emerging, fast-growing, worldwide market valued at over \$90 billion by 2023.***



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## Table of Contents

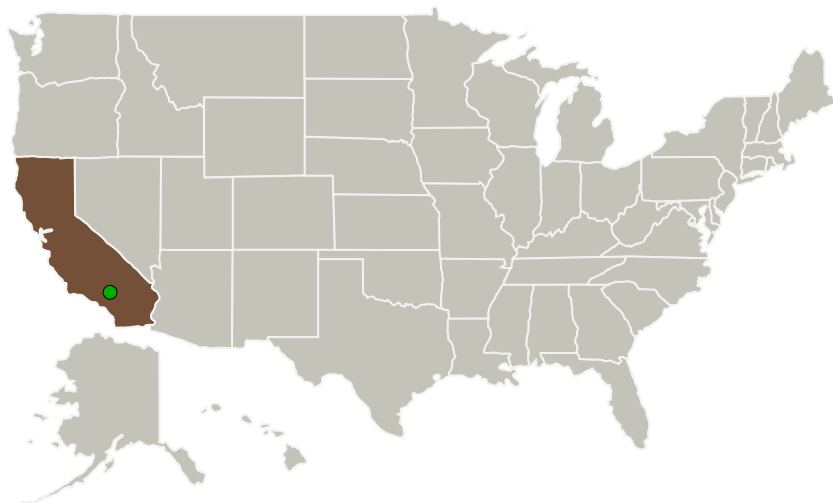
Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	2
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Images	3
Technology Areas	3
Target Destinations	3

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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Redondo Optics, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Redondo Beach, California
● Armstrong Flight Research Center (AFRC)	Supporting Organization	NASA Center	Edwards, California

## Primary U.S. Work Locations

California

## Project Transitions

**July 2018:** Project Start**February 2019:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/137844>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Redondo Optics, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

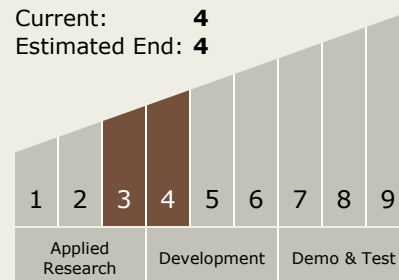
Carlos Torrez

**Principal Investigator:**

Edgar A Mendoza

## Technology Maturity (TRL)

Start: **3**  
 Current: **4**  
 Estimated End: **4**



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## Images



### Briefing Chart Image

Intelligent Wireless Fiber Optic Sensor (iWiSe) Network System, Phase I

(<https://techport.nasa.gov/image/127449>)



### Final Summary Chart Image

Intelligent Wireless Fiber Optic Sensor (iWiSe) Network System, Phase I

(<https://techport.nasa.gov/image/126108>)

## Technology Areas

### Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - └ TX05.5 Revolutionary Communications Technologies
    - └ TX05.5.2 Quantum Communications

## Target Destinations

Earth, The Moon, Mars